Passions of the Crawl

and

Selected Readings From the IRC

2004 State Building Energy Codes Workshop

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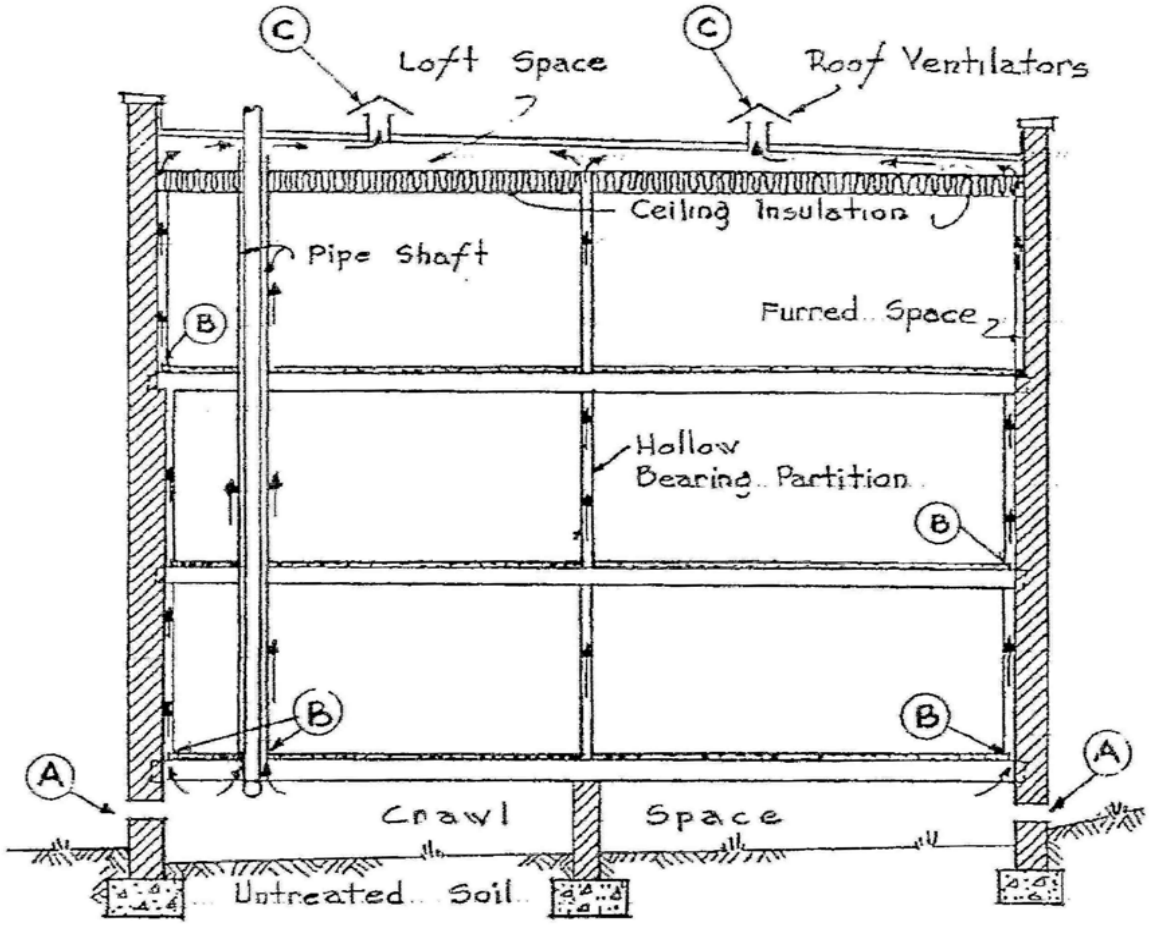
Passion

- **To vent or not to vent the crawl space**
- To vent or not to vent the attic
- Build it tight / Let it breathe
- Wall vapor barriers are: Good / Evil



(A) = Inadequate wall ventilation

(B) = Openings in floor 1/8" ±, continuous

(C) = Roof ventilation misplaced unless vents are also in side walls above top ceiling floor.

→ → Arrows indicate path of warm humid air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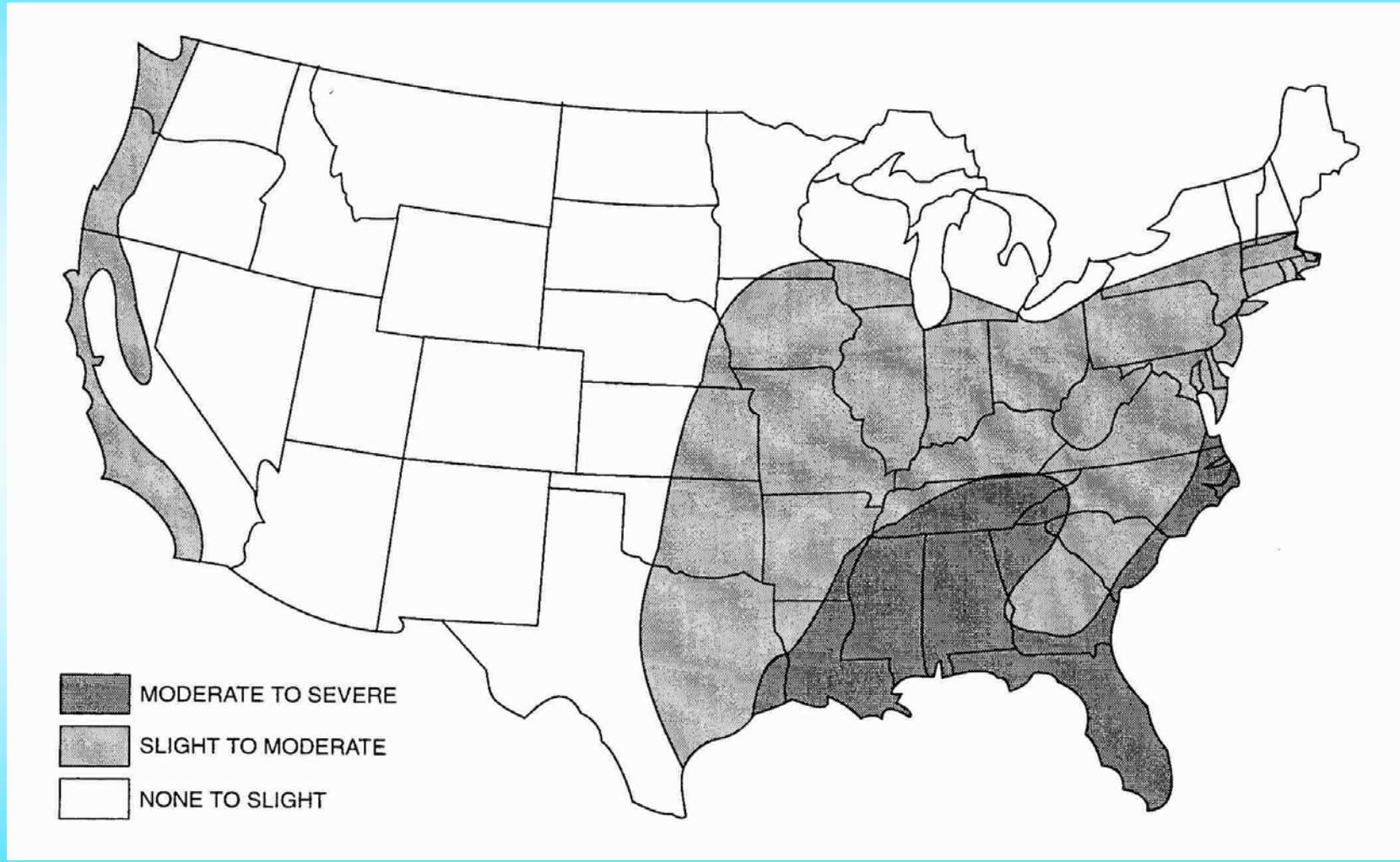
ATCO RUBBER PRODUCTS, INC.
6" DIA.
6" DIA.
2003.05.20


2003.05.20


TCO RUBBER PRODUCTS
3.2.8
PROTIMETER
SURVEYMASTER
2003.05.20

IRC Decay Probability Map



Why Section R408 Can't Cope?

SECTION R408
UNDER-FLOOR SPACE

R408.1 Ventilation. The under-floor space between the bottom of the floor joists and the earth under any building (except space occupied by a basement or cellar) shall be provided with ventilation openings through foundation walls or exterior walls. The minimum net area of ventilation openings shall not be less than 1 square foot for each 150 square feet (0.67 m^2 for each 100 m^2) of under-floor space area. One such ventilating opening shall be within 3 feet (914 mm) of each corner of said building.

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R408.2 Openings for under-floor ventilation. The minimum net area of ventilation openings shall not be less than 1 square foot (0.0929 m^2) for each 150 square feet (100 m^2) of underfloor space area. One such ventilating opening shall be within 3 feet (914 mm) of each corner of the building. Ventilation openings shall be covered for their height and width with any of the following materials provided that the least dimension of the covering shall not exceed $^1/_4$ inch (6.4 mm):

Exceptions:

1. Where warranted by climatic conditions, ventilation openings to the outdoors are not required if ventilation openings to the interior are provided.
2. The total area of ventilation openings may be reduced to 1/1,500 of the under-floor area where the ground surface is treated with an approved vapor retarder material and the required openings are placed so as to provide cross-ventilation of the space. The installation of operable louvers shall not be prohibited.
3. Under-floor spaces used as supply plenums for distribution of heated and cooled air shall comply with the requirements of Section M1601.4.
4. Ventilation openings are not required where continuously operated mechanical ventilation is provided at a rate of 1.0 cfm (10 m^2) for each 50 square feet (1.02 L/s) of underfloor space floor area and ground surface is covered with an approved vapor retarder material.
5. Ventilation openings are not required when the ground surface is covered with an approved vapor retarder material, the space is supplied with conditioned air and the perimeter walls are insulated in accordance with Section N1102.1.7.

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3. Under-floor spaces used as supply plenums for distribution of heated and cooled air shall comply with the requirements of Section M1601.4.
4. Ventilation openings are not required where continuously operated mechanical ventilation is provided at a rate of 1.0 cfm ($10\ m^2$) for each 50 square feet (1.02 L/s) of underfloor space floor area and ground surface is covered with an approved vapor retarder material.
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SECTION R322
MOISTURE VAPOR RETARDERS

R322.1 Moisture control. In all framed walls, floors and roof/ceilings comprising elements of the building thermal envelope, a vapor retarder shall be installed on the warm-in-winter side of the insulation.

Exceptions:

1. In construction where moisture or freezing will not damage the materials.
2. Where the framed cavity or space is ventilated to allow moisture to escape.
3. In counties identified with footnote a in Table N1101.2.

Other IRC Complications

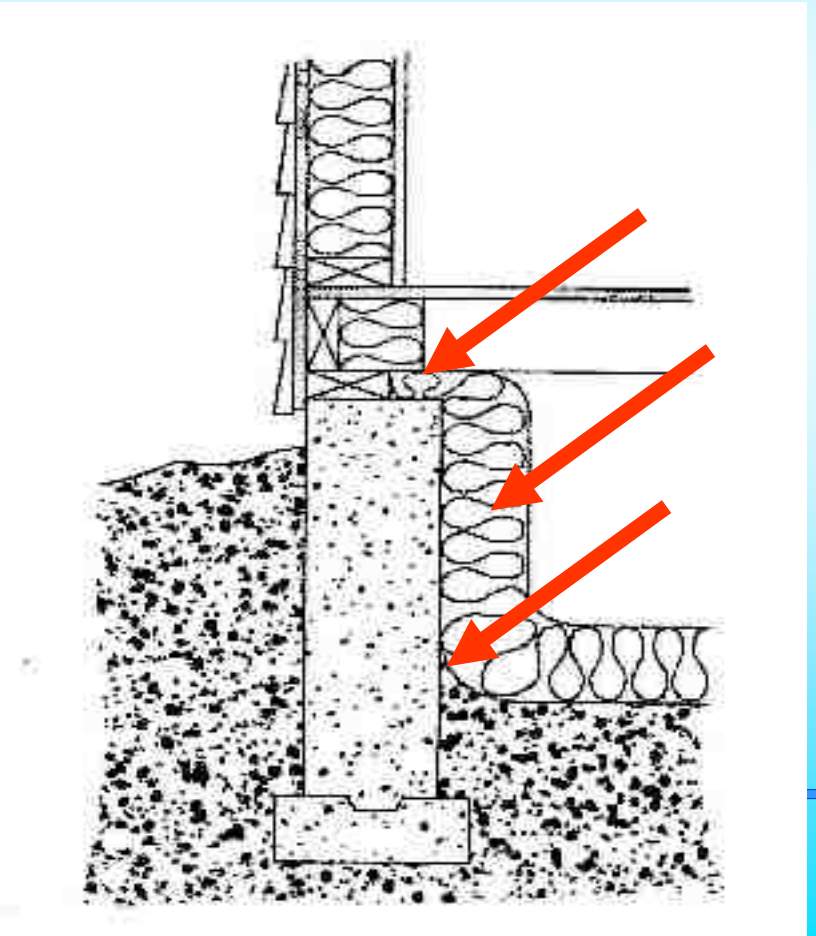
- R318 Foam Plastics
  - Contradictory provisions that restrict use of rigid foam board for wall insulation

Other IRC Complications

- R324 Termite Protection
  - No clear reference to crawl spaces and language that indicates inspection gaps for foam board wall insulation

Other IRC Complications

- Chapter 11 and IECC
  - Complicated language for wall insulation plus moisture and termite issues



Crawl H^2O passions

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Confusing code =

Code approval delays & denials

Engineer letters

Added builder costs

The Codes
They Are a A-Changin’

Approved 2004 IRC Code Changes

New R408.3: Unvented crawl space provision

- Continuous vapor retarder attached/sealed 6” up walls, wall insulation, and 1 of following:
  - **Continuous exhaust with air pathway from house (1 cfm/50 sf)**
  - **Conditioned air supply with return air path to house (1 cfm/50 sf)**
  - **Plenum space**

NC Residential Code Changes

- Provides clear compliance pathway for closed crawls
- Improves wall vented crawl spaces
- Addresses foam insulation, termite protection, and insulation conflicts and issues
- Allows wall or floor insulation
- Major rewrite with 2 levels of commentary
- Under active rulemaking since 12/03

NC Residential Code Changes

R408 renamed Wall Vented Crawl Spaces

- Ground vapor retarders required w/ drainage
- Vented crawls separated from basements, porches & garages
- Floor and crawl duct sealing specified

NC Residential Code Changes

New Section R409 Closed Crawl Spaces

- Ground vapor retarders include sealed liner and concrete floor requirements
- Air sealed walls
- Floor and wall insulation options
- Space moisture control requirements
  - Dehumidifier, supply air, house air, exhaust, conditioned space and plenum

NC Residential Code Changes

Language example

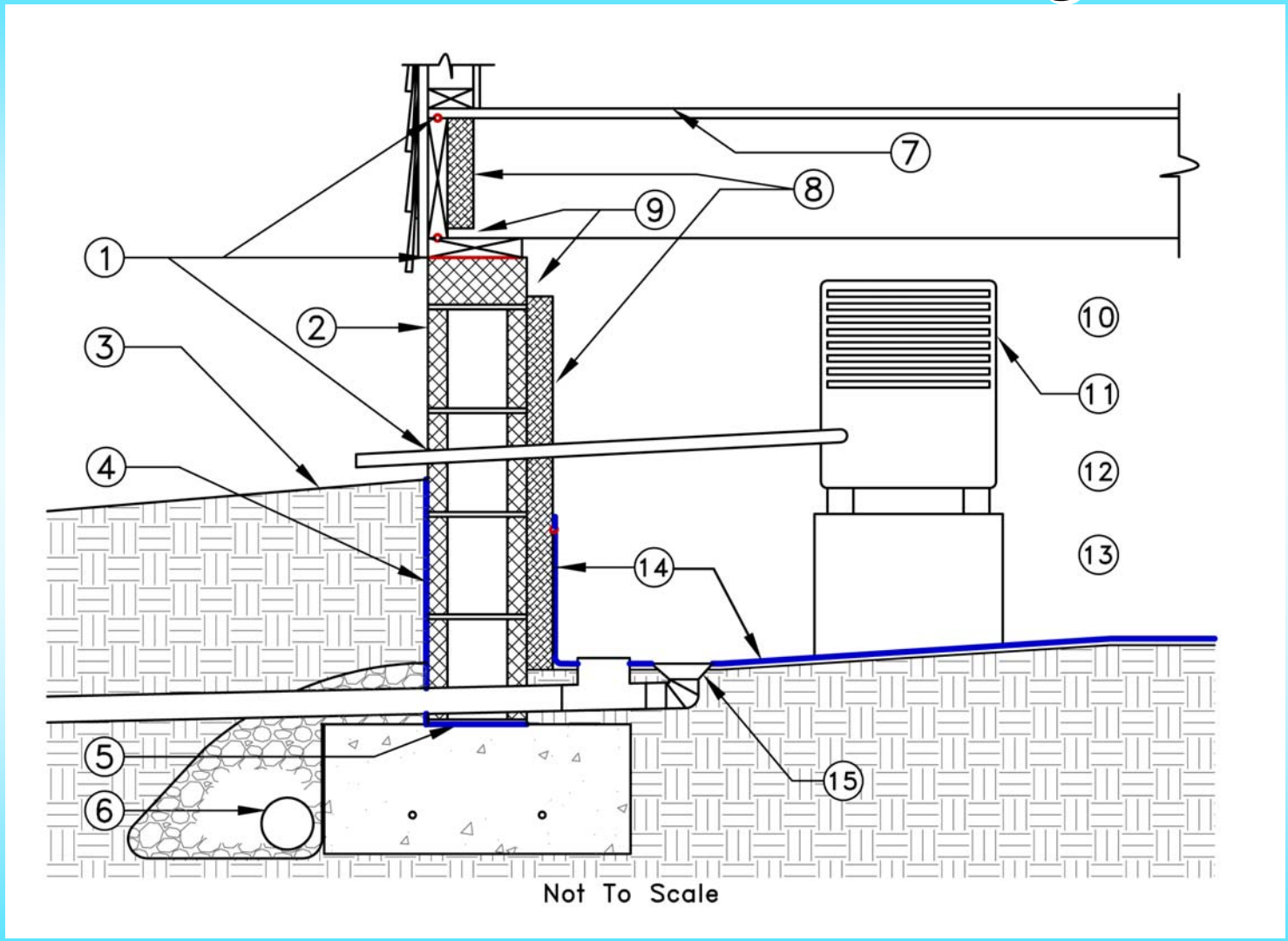
“R409.1 Air sealed walls. Closed crawlspaces shall be built to minimize the entry of outdoor air into the crawl space. Specifically prohibited are foundation wall vents and wall openings to ventilated porch foundations…”

Passions of the Closed Crawl

- Wall insulation
- Termites and foam insulation
- Breathing crawl space air
- Mechanical space conditioning
- Poly attached to walls
- Construction moisture control

Best practice versus code minimums

AE Best Practice Designs



AE Best Practice Designs